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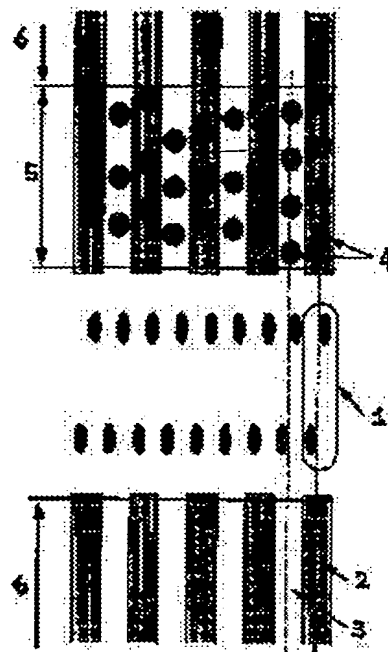
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(54) OPTICAL RECORDING MEDIUM AND RECORDING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To realize a high density magneto-optical disk by spirally or concentrically forming a pair of wobble pits and alternately forming grooves and lands in the area where the wobble pit isn't formed.

SOLUTION: A pair of wobble pits 1 are formed on an optically transparent substrate, and the groove 2 is formed on a spiral line passing through its center, and the width of the land part 3 adjacent to the groove 2 is nearly equal to the width of the groove 2. Then, recording timing is controlled by a reflection signal from the wobble pit, and header information is recorded on the magnetic domain 4 of the groove part 2 and the land part 3 of a header 5. Since land/groove recording becomes possible through good use of magnetic super resolution or a groove depth, a high density optical disk is realized.



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CLAIMS

[Claim(s)]

[Claim 1] Spiral at spacing with the wobble pit of the couple for truck error signal generating, or the optical recording medium characterized by forming the groove and land of an almost equal phase mold of width of face by turns by radial on the center line of said wobble pit in the field in which it is formed in the shape of a concentric circle, and said wobble pit is not formed.

[Claim 2] The optical recording medium according to claim 1 with which the wobble pit of a couple corresponding to a groove and the wobble pit of the couple corresponding to a land exist independently, respectively.

[Claim 3] The optical recording medium according to claim 1 shared by the land on which each of the wobble pit of the couple corresponding to a groove adjoins the groove, and said groove.

[Claim 4] The optical recording medium according to claim 1 with which a record layer is a magneto-optic-recording layer or a phase change mold record layer, and header information is beforehand recorded on said land and groove section as a lightwave signal of the optical MAG or a phase change mold.

[Claim 5] The optical recording medium according to claim 1 whose frame number to which the header information which the plurality recorded as the above mentioned lightwave signal follows belongs are the integer which continued from the inner circumference to the periphery in a land and the groove section, respectively, and any frame number in a land is larger than which frame number of the groove section, or is small.

[Claim 6] It is formed on spiral or a concentric circle at spacing with the wobble pit of the couple for truck error signal generating. The groove and land of an almost equal phase mold of width of face in the field in which said wobble pit is not formed to the optical recording medium formed by turns by radial on the center line of said wobble pit with the reflective signal from said wobble pit. The optical recording approach characterized by recording header information as said lightwave signal beforehand by controlling the record timing of header information.

[Claim 7] The optical recording approach according to claim 6 which continues at header information and records the data for performing a search FAI test in the same process in case header information is beforehand recorded as a lightwave signal.

[Claim 8] In case header information is beforehand recorded as a lightwave signal, a land is recorded and followed first and they are the groove section or the optical recording approach according to claim 6 which records and carries out sequential record to the groove section continuously first at a land.

[Claim 9] The optical recording approach according to claim 6 of making the frame number to which the header information which plurality follows belongs into the integer which continued from the inner circumference to the periphery in a land and the groove section, respectively, and making any frame number in a land greatly or smaller than which frame number of the groove section, and performing exchange frame processing after search FAI independently in a land and the groove section.

[Claim 10] The optical recording approach according to claim 6 of registering the defect frame of a land or the groove section into the specific region of the land or the groove section to which the defect frame belongs, and registering the file name of the data recorded on a land or the groove section into the specific region of the land or the groove section to which said data belong.

[Claim 11] The optical recording approach according to claim 6 which shifts record of data to remaining one side after recording data on one of all the record sections of a land or the groove section.

[Claim 12] The optical recording approach according to claim 6 that add the recognition sign in the file name of said user data, and said user data registers only one file over a land and the groove section when one user data exceeds a land or groove section independent intact storage capacity and does not exceed the intact storage capacity of a land and the groove section sum total.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Optically, with respect to the optical recording medium and the optical recording approach of carrying out land & groove record in which the account rec/play student of information is possible, this invention has good ID signal and relates to the conventional optical recording medium in which stability and high-speed record playback are more possible than land & groove record and the conventional optical recording approach especially.

[0002]

[Description of the Prior Art] Current and an optical disk are used as a record medium which can reproduce a sound signal and a picture signal. The magneto-optic disk and the phase change mold disk are briskly developed as a high density record medium which can rewrite and has portability.

[0003] There are spiral or two approaches of [in order to increase the recording density of the optical disk record medium which records information in the shape of a concentric circle] the cutback of a track pitch and improvement in track recording density. In any case, it is realizable with short wavelength-ization of the semiconductor laser used for record playback. However, before the semiconductor laser of short wavelength is cheap and appears on the market in a commercial scene, it is likely to take time amount now for the time being. In such a situation, it gropes for the method of raising recording density to the maximum extent, with the semiconductor laser of the present wavelength used like the optical super resolution using the temperature change of a refractive index, or the magnetic super resolution in a magneto-optic disk.

[0004] At a RAM disk like a magneto-optic disk or a phase change mold disk, the pit is formed with the ROM disk on which information is beforehand recorded like CD-ROM using the gas laser of short wavelength to using the same semiconductor laser in the time of informational writing and playback. Although the laser which uses a ROM disk for playback as compared with RAM disk equipment is the same, the RAM disk which performs record playback, without using and recording laser with expensive short wavelength at the time of record, and using such expensive short wavelength laser is more disadvantageous than a record condition top ROM disk. For this reason, also in DVD specification which attracts attention as a next-generation image record medium for homes, it is in the situation that a proposal which supports the storage capacity of a full ROM disk by the RAM disk of the same magnitude is not made.

[0005] If land & groove record is the same track pitch, since it can double recording density compared with land record or groove record in the same track recording density, it is a technique very attractive when creating a high density optical recording medium. Especially most RAM disks used now are performing land record or groove record in the substrate with which the slot was formed beforehand, and a thing recordable on both a land and a groove is desired.

[0006] Moreover, the current optical disk substrate is creating the substrate by the imprint from La Stampa irrespective of technique, such as the injection method and 2P law. The stroke of creating a land, a groove, and a glass master substrate with the information on a pit using laser cutting equipment, imprinting the information on a glass master substrate, creating La Stampa, and creating a substrate using La Stampa further is used for this creation approach. Thus, in order to repeat a complicated and detailed process for creation of a land, a groove, and the optical disk substrate that has a pit, the device which carries out manufacture to stability easily by the design of a land, a groove, and a pit is made. For example, in JP,7-31813,B, in the optical disk substrate of a sample servo system, in order to prevent the double imprint of a pit to creation time, the groove or the continuous pit is prepared near the truck which has a pit. Moreover, in JP,7-19375,B, in order to enable it to read appropriately the flag part of the header unit which constitutes a sector, the device of not preparing a guide rail in a part for flag data division is made.

[0007] Moreover, it is a very difficult technique to cut a groove and to create the pit of a preformat on a land in the optical disk of high density which will appear in the near future, and the optical disk of an especially narrow track pitch, even if it uses above-mentioned short wavelength gas laser. Moreover, even if it conquers these difficult techniques, it is still more difficult to read and make into accuracy header information by the phase pit written in in the narrow truck using the present semiconductor laser with comparatively long wavelength, maintaining compatibility. In JP,7-296390,A, in order to realize stable and highly precise tracking, the optical disk which prepared the land, the groove, and the pre pit and in which land & groove record is possible is proposed. According to this, the track pitch of PURIPITTO for having prepared the pre pit in order to record address information, not preparing a groove in the PURIPITTO section, but reading address information is usually the one half of the track pitch of the optical disk of land record or groove record. In a narrow track pitch, with the semiconductor laser light usually used, since the wavelength of the light becomes long as compared with the track pitch of PURIPITTO, it is difficult to read to accuracy.

[0008]

[Problem(s) to be Solved by the Invention] This invention tends to offer the optical recording medium and its record approach of the high density in which the stable manufacture is possible in the optical recording medium in which land & groove record is possible, and the optical recording approach by creating a land and a groove on the center line of a wobble pit, and taking the approach of carrying out record playback of the address and the flag signal of each frame by the optical MAG or the phase change.

[0009]

[Means for Solving the Problem] This invention relates to spiral or the optical recording medium characterized by forming the groove and land of an almost equal phase mold of width of face by turns by radial on the center line of

is realizable. Moreover, since header information is recorded by the optical MAG signal, it is not necessary to create phase pits other than a wobble pit at the time of substrate manufacture, and it also becomes possible to use the technique which made substrate manufacture easy and was excellent in land & groove record playback peculiar to a magneto-optic recording, and the very exact record of it is attained by taking timing from the reflective signal from a wobble pit further. Thus, access stabilized also in the optical disk of high density by clear and exact record playback of header information is attained, and it also becomes possible to maintain the outstanding compatibility.

[0026] Drawing 3, drawing 4, and drawing 5 show typically three kinds of magneto-optic disks used for this example. Although a land or a groove exists on the center line of the wobble pit of a couple and the polarity of a wobble pit is always fixed in drawing 3, a land and a groove appear one by one for every round on the same center line. One center line of a wobble pit exists spirally like this drawing 3. In drawing 4, two center lines of a wobble pit exist spirally like a4 and b4 in drawing. In drawing 5, the center line of a wobble pit is not concerned with a land and a groove like a5, b5, c5, and d5 in drawing, but has become concentric circle-like, and each truck has closed it. It is possible to fully demonstrate the above-mentioned effectiveness also by these cases.

[0027] (Example 2) The 2nd example is shown in drawing 2. As shown in drawing, the wobble pit for acquiring a tracking error signal is optically formed on a transparent substrate. That is, this example exists in the form where the groove and land of an adjoining lot share one pit in the wobble pit of a couple. The case on the center line of a land, and in a case of on [the center line of a groove], a polarity reverses the wobble pit in this example. That is, to the first pit appearing in the left and the next pit appearing in the right to the direction where a beam advances, by truck A in drawing (truck corresponding to the wobble pit pair corresponding to a groove), by the adjoining truck B (truck corresponding to the wobble pit pair corresponding to a land), the first pit appears in the right and the next pit appears in the left. By this approach, since the polarity of a tracking error signal is reversed for every truck, it can be used according to a land and a groove, being able to change tracking control electrode nature.

[0028] By the disk of this example, the groove section is formed in parts other than the wobble pit on the core of Truck A, and the groove section and the land of almost equal width of face are formed on the center line of the adjoining truck B. What showed typically the magneto-optic-disk substrate used for this example is shown in drawing 6. The wobble pit 56 of the couple of a pit 51 and a pit 52 is constituted, and the groove 2 exists in the appearance shown all over [a6] drawing on the center line of said wobble pit pair. The truck shown all over [a6] this drawing is equivalent to the truck A of drawing 2. one (a pit 51 or pit 52) of the wobble pit pair 51-52 aforementioned pits -- further -- the next pit (a pit 54 or pit 53) and a pair -- accomplishing -- a new wobble pit pair -- as shown all over [b6] drawing on the center line of 55 (the pair of 51 and 54, or pair of 52 and 53), the land 3 exists. The truck shown all over [b6] drawing is equivalent to the truck B of drawing 2. As shown in drawing 2 and drawing 6, the polarity of a wobble pit is reversed by the land and the groove.

[0029] The magneto-optic-recording layer was formed by the sputtering method to the created substrate like the above. In a actual activity, like an example 1, although header information is required, the magnetic domain 24 is recorded for header information on the groove section 2 and the land 3 of a header unit 25 by carrying out the content rule of the record timing with the reflective signal from the wobble pit of this invention. By using magnetic super resolution or the groove depth well, since a land and groove record are possible, it is not necessary to form the phase pit in which the problem resulting from the problem and the physical structure of a cross talk is held as header information by the magneto-optic-recording medium. In case header information is recorded like the above, in order to judge the quality of the frame which is the required minimum unit on data control, the signal for search FAI is simultaneously recorded on the land and the groove section of data division 26, and search FAI is performed. Next, a defect frame is judged and a defect frame is registered.

[0030] Here, as shown in drawing 2, in this example, one buffer truck 33 was separated from the control truck 32 in the inner circumference section, the defect management section 36 is specified, and the number of the defect frame of the groove section is recorded on the data division 26 of the groove section 2 as a magnetic domain 34 following a header unit 25. Moreover, the defect frame number of a land is similarly recorded on the data division 26 of a land 3 as a magnetic domain 35 following a header unit 25. That is, the defect frame of a land is registered into a specific region with a land, and the defect frame of the groove section is registered into the groove section and a specific region. Moreover, in a land and the groove section, it is independently processed so that the defect frame of a land or the defect frame of the groove section may not be mutually interwoven with each other. Furthermore, after record of user data uses one of all the capacity of a land or the groove section in a actual activity, record actuation is shifted to one of the fields of the land in which a blank part exists, or the groove section. Moreover, the file name of user data is registered into a specific region with the land or the groove section to which each data belongs. However, when exceeding the defined capacity in which the total storage capacity of a land or the groove section has one file and exceeding the intact capacity of a land or a groove, the file over a land and the groove section can be registered by adding a certain recognition sign to the file. That is, a file recordable ranging over a land and the groove section is only one.

[0031] Thus, according to the example 2, land & groove record is attained, the disk of high density can be realized, substrate creation becomes very easy, and low-pricing of a magneto-optic-recording medium can be realized. Furthermore, header information can be clearly read as an optical MAG signal using the technique which was [super resolution / optical super resolution like land & groove record, / magnetic] excellent. Moreover, very exact record is attained by taking timing from the reflective signal from a wobble pit. Thus, access stabilized also in the optical disk of high density by clear and exact record playback of header information is attained, and it also becomes possible to maintain the outstanding compatibility.

[0032] Furthermore, by using a land and a groove independently, the change of a land and a groove is suppressed to the minimum, and the mistake at the time of access is suppressed. For this reason, while the change uses the required magneto-optic disk by the land and the groove, it does not become lowering of an access rate. Moreover, it also becomes possible to use total storage capacity without futility, processing the land and the groove independently.

[0033]

[Effect of the Invention]

[0034] Since creation becomes possible [manufacturing the optical disk which does not use the header by the difficult phase pit] by using the optical recording approach of this invention, an optical disk substrate can be created easily. Moreover, since record of the header information by the phase pit becomes still more difficult from the actual condition when a track pitch is narrow, when a ** track pitch tends to realize high density, especially this effectiveness is remarkable. Moreover, it becomes possible to carry out record playback of the header signal using the

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the wobble pit of an optical disk and the enlarged drawing for a header unit in this invention.

[Drawing 2] It is the enlarged drawing of the control truck part containing a part for the wobble pit of the optical disk in this invention, and a header unit.

[Drawing 3] It is the mimetic diagram having shown the relation between the wobble pit concerning this invention, a land, and a groove.

[Drawing 4] It is the mimetic diagram having shown the relation between the wobble pit concerning this invention, a land, and a groove.

[Drawing 5] It is the mimetic diagram having shown the relation between the wobble pit concerning this invention, a land, and a groove.

[Drawing 6] It is the mimetic diagram having shown the relation between the wobble pit concerning this invention, a land, and a groove.

[Description of Notations]

1. Wobble Pit Pair
2. Groove
3. Land
4. Magnetic Domain Used as Header Information
5. Header Information Records Department
6. User data Records Department
21. Wobble Pit Pair corresponding to Groove
22. Wobble Pit Pair corresponding to Land
24. Magnetic Domain Used as Header Information
25. Header Information Records Department
26. User data Records Department
32. Control Truck
33. Buffer Truck
34. Magnetic Domain Used as User Data on Groove
35. Magnetic Domain Used as User Data on Land
36. Defect Management Truck Section
- An a4. groove and the center line of a wobble pit pair
- A b4. land and the center line of a wobble pit pair
- The center line closed on the a5. groove and the concentric circle of a wobble pit pair
- The center line closed on the b5. land and the concentric circle of a wobble pit pair
- The center line closed on the c5. groove and the concentric circle of a wobble pit pair
- The center line closed on the d5. land and the concentric circle of a wobble pit pair
- An a6. groove and the spiral center line of a wobble pit pair
- A b6. land and the spiral center line of a wobble pit pair
51. The Wobble Pit Pair is Pit with the Same Center Line as Groove at One of the Wobble Pit Pairs Used as Pit 52 and Pair.
52. The Wobble Pit Pair is Pit with the Same Center Line as Groove at One of the Wobble Pit Pairs Used as Pit 51 and Pair.
53. The Wobble Pit Pair is Pit with the Same Center Line as Land at One of the Wobble Pit Pairs Used as Pit 52 and Pair.
54. The Wobble Pit Pair is Pit with the Same Center Line as Land at One of the Wobble Pit Pairs Used as Pit 54 and Pair.
55. Wobble Pit Pair corresponding to Land
56. Wobble Pit Pair corresponding to Groove

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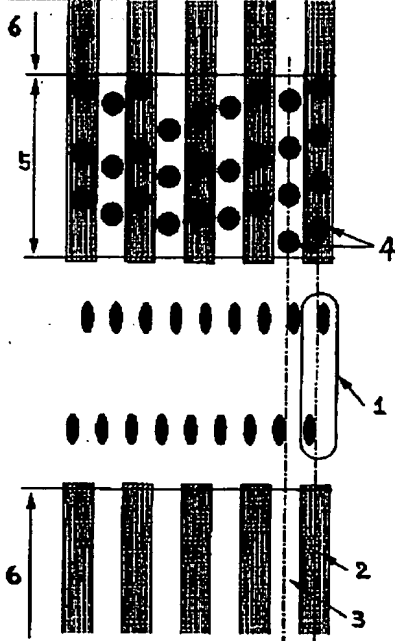
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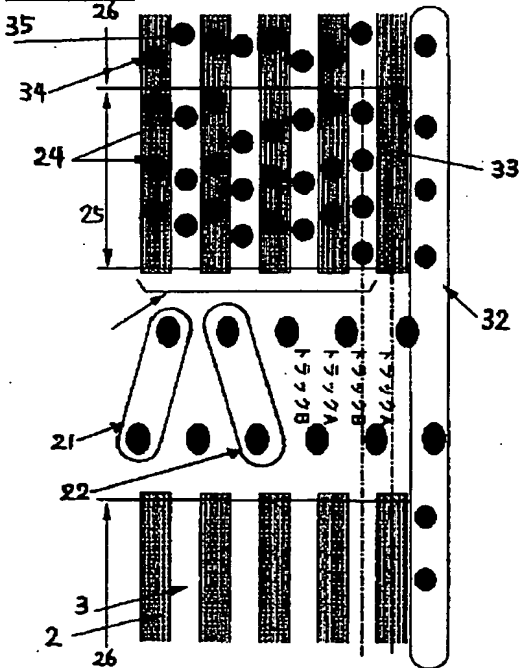
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DRAWINGS

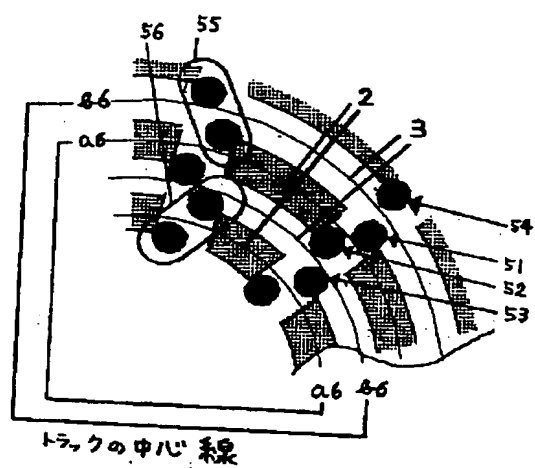
[Drawing 1]



[Drawing 2]



[Drawing 3]



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